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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/367,153	08/09/1999	ALASTAIR SIBBALD	62-194	3951

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CREATIVE LABS, INC.
LEGAL DEPARTMENT
1901 MCCARTHY BLVD
MILPITAS, CA 95035

EXAMINER	
FAULK, DEVONA E	
ART UNIT	**PAPER NUMBER**
2644	

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/367,153	SIBBALD ET AL.	
	Examiner	Art Unit	
	Devona E. Faulk	2644	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *54-87* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *54-87* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/15/2005*.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *11/10/2005* .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Remarks

1. Applicant's remarks, filed 11/15/2005, with respect to newly recited claims 54-87 overcoming the prior art used in previous rejections is persuasive. However, upon further consideration, a new ground(s) of rejection is made in view of Brungart.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims **54,57-59,61,62,65,75,78,79,82,83 and 86** are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*).

Claims **54,66,75,83 and 86** share common features.

Regarding **claims 54,66,75,83 and 86** the applicant's admitted prior art discloses a method of providing localization cues to a source audio signal to perceive a sound source at a selected direction and a selected distance from a listener's head based on a head related transfer function (HRTF) pair determined for the sound source located at the selected direction and a reference distance at a larger distance from the listener's head (Figure 8), the method comprising:

Providing a two channel audio signal from the source audio signal (Figure 8);

Spectrally shaping the two channel audio signal based on the HRTF pair (Figure 8);

Introducing a time delay between the channels of the two channel audio signal based on an interaural time delay associated with the selected direction (Figure 8); and

Applying a different gain factor to each of the two channels (Figure 8; implicit to HRTF processing).

Wherein the different gain factors are determined based on the selected direction (Figure 8; implicit to HRTF processing; The inter-aural time difference, as taught by the applicant's admitted prior art (Figure 8), describes the time delay between sounds arriving at the left and right ears. An interaural time difference (ITD) will also have associated with it an interaural intensity difference, i.e., a difference in the magnitude of each HRTF. An ITD thus means a time difference and a magnitude difference (generally) and it is clear that the greater distance has a lesser magnitude. The magnitude components of the HRTFs to the left and right ears for a given virtual location, are different because the left and right ears are not the same distance from the source.).

The prior art fails to disclose but Brungart teaches of wherein the gain factors are determined based on the selected near field distance from the listener's head. Brungart discloses that localization in the near-field must rely on the same basic

types of cures a far-field localization and gives an equation for the pressure on the surface of a sphere due to a nearby point source and indicates that the equation can be used to determine the interaural intensity differences (IID) and interaural time delay (ITDs) for any direction and any distance relative to the head (page 3).

Regarding **claim 86**, Brungart further teaches that 1 m is the standard distance used for HRTF processing (See Brungart, Introduction and The Importance of the Near-Field).

It would have been obvious to modify the applicant's admitted prior art to provide localization in the near field, thus determining the gain factors at near field distances in order to provide accurate auditory representations of nearby sources (Brungart, page 1, under section titled 'The Importance of the Near-Field).

Regarding **claims 57,78 and 85** the applicant's admitted prior art as modified by Brungart discloses wherein the different gain factors are determined by selecting the interaural time delay associated with the selected direction as representing the difference in path lengths between the sound source and the respective ears, determining a horizontal plane azimuth from the interaural time delay (implicit; the ITD is a cue for azimuth), and determining the respective sound source to ear distances for the sound source positioned at the near field distance (See above apropos rejection of claim 54,75 and 83).

Regarding claims **58,59 and 79**, the applicant's admitted prior art as modified by Brungart discloses wherein the reference distance is about 1.0 m (claims 58, 59 and 79)

and that the near field distance is greater than or equal to 0.2 m and less than or equal to about 1m (claim 79; see Brungart, section labeled the importance of near field).

Regarding claims **61 and 81** the applicant's admitted prior art as modified by Brungart discloses wherein applying a different gain factor occurs after the spectral shaping of the left and right channel signals (implicit to applicant's admitted prior art, Figure 8; See above apropos rejection of claims 54 and 75).

Regarding **claim 62**, the applicant's admitted prior art as modified by Brungart discloses further comprising modifying the frequency response of one of the two channels to reflect head shadowing effects at the near-field distance (Brungart, Figure 1).

Regarding claims **65 and 82**, the applicant's admitted prior art as modified by Brungart fails to disclose but Begault teaches of wherein applying a different gain factor occurs before the spectral shaping of the left and right channels and wherein introducing a time delay between the channels of the two channel audio signal occurs before applying a different gain factor to each of the two channels (applicant's admitted prior art Figure 8 shows the ITD, a gain factor is implicitly determined after the delay; See above apropos rejection of claims 54 and 75).

4. Claims **55,66-70,72,73 and 75** rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Begault (3D Sound For Virtual Reality and Multimedia).

Regarding **claim 66**, the combination of the applicant's admitted prior art and Brungart meet all elements of that claim, as stated above in apropos of claim 54, with the exception that there is a computer readable storage medium having a program with instructions. Begault teaches the concept of a program that can implement or enable the process (Chapter 4). There obviously would have to be a computer readable medium of some sort to enable the program to run. Thus it would have been obvious to one of ordinary skill in the art at the time of the invention to use a computer program to implement the processing for the benefit of producing a more robust virtual sound image. .

Regarding **claims 55, 67, 76** the applicant's admitted prior art as modified by Brungart fails to disclose but Begault teaches of wherein the different gain factors are determined for each ear based on the inverse square of the respective sound source to ear distances for the sound source positioned at the selected near field distance from the listener's head. Begault teaches of distances determined by the sound intensities using the inverse square law for intensity vs. distance (Chapter 3, Section titled Intensity, Loudness and Cues on pages 70-72). It is obvious that since distances can be determined from the gain, that the reverse is true and the magnitude can be determined from the distance. Therefore, it would have been obvious to modify the applicant's admitted prior art as modified by Brungart to determine the gains based on the inverse square law as taught by Begault in order to determine the coordinates of the external sound source.

Regarding claims **69 and 70**, the applicant's admitted prior art as modified by Brungart discloses wherein the reference distance is about 1.0 m (claim 69) and that the near field distance is greater than or equal to 0.2 m and less than or equal to about 1m (claim 70; see Brungart, section labeled the importance of near field).

Regarding **claim 72** the applicant's admitted prior art as modified by Brungart discloses wherein applying a different gain factor occurs after the spectral shaping of the left and right channel signals (implicit to applicant's admitted prior art, Figure 8; See above apropos rejection of claims 66).

Regarding **claim 73**, the applicant's admitted prior art as modified by Brungart discloses further comprising modifying the frequency response of one of the two channels to reflect head shadowing effects at the near-field distance (Brungart, Figure 1).

5. **Claims 56,77,84, and 87** are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Raydon et al. (U.S. Patent 3,969,588).

Regarding **claims 56,77,84 and 87**, the applicant's admitted prior art as modified by Brungart fails to disclose but Raydon teaches of wherein the different gain factors are determined by providing a look-up table of gain values indexed by the interaural time delay associated with the selected direction and selecting the respective gain values from the look-up table. Raydon discloses a look-up table having gain settings as a function of distance (column 19, lines 59-64). Using a computer program to implement the processing is obvious for the benefit of having the most precise and

accurate data and to have stable operations. It would have been obvious to modify the applicant's admitted prior art as modified by Brungart by using a look-up as taught by Raydon in order to quickly retrieve values for the benefit of reducing processing time.

6. **Claim 63** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Lambrecht (U.S. Patent 6,181,800).

Regarding **claim 63**, the applicant's admitted prior art as modified by Brungart fails to disclose but Lambrecht teaches of wherein the HRTF pair is selected from a plurality of HRTF pairs respectively corresponding to a plurality of directions at the reference distance (column 5, lines 21-23). It would have been obvious to modify the applicant's admitted prior art as modified by Brungart so that an HRTF pair is selected from a plurality of HRTF pairs in order to produce positional errors within an acceptable range (column 5, line 32-33).

7. **Claim 64** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Sibbald et al. (U.S. Patent 5,666,425).

Regarding **claim 64**, the applicant's admitted prior art as modified by Brungart fails to disclose but Sibbald discloses wherein the source audio signal having being provided with localization cues is combined with a further two or more channel audio signal (abstract; column 5, lines 48-66; column 7, lines 19-22). It would have been obvious to modify the applicant's admitted prior art as modified by Brungart to combine the source audio signal provided with localization cues with a two or more channel

audio signal in order to provide signals which are suitable to directly drive loudspeakers or headphones or which are suitable to be recorded (column 7, lines 19-22).

8. **Claims 60 and 80,** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Begault (U.S. Patent 5,173,944).

Regarding **claims 60 and 80**, the applicant's admitted prior art as modified by Brungart fails to disclose but Begault teaches of wherein applying a gain factor occurs before the spectral shaping of the left and right (Figure 2). The applicant's admitted prior art as modified by Brungart discloses that each channel implicitly will have a different gain (See above apropos rejection of claim 54). It would have been obvious to modify the applicant's admitted prior art as modified by Brungart to apply a different gain before the spectral shaping occurs in order to increase the value of the signal (column 4, line 47).

9. **Claim 68** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Begault (3D Sound For Virtual Reality and Multimedia) in further view of Raydon et al. (U.S. Patent 3,969,588).

Regarding **claim 68**, the applicant's admitted prior art as modified by Brungart fails to disclose but Raydon teaches of wherein the different gain factors are determined by providing a look-up table of gain values indexed by the interaural time delay associated with the selected direction and selecting the respective gain values from the look-up table. Raydon discloses a look-up table having gain settings as a

function of distance (column 19, lines 59-64). Using a computer program to implement the processing is obvious for the benefit of having the most precise and accurate data and to have stable operations. It would have been obvious to modify the applicant's admitted prior art as modified by Brungart by using a look-up as taught by Raydon in order to quickly retrieve values for the benefit of reducing processing time.

10. **Claim 74** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Begault (3D Sound For Virtual Reality and Multimedia) in further view of Lambrecht (U.S. Patent 6,181,800).

Regarding **claim 74**, the applicant's admitted prior art as modified by Brungart fails to disclose but Lambrecht teaches of wherein the HRTF pair is selected from a plurality of HRTF pairs respectively corresponding to a plurality of directions at the reference distance (column 5, lines 21-23). It would have been obvious to modify the applicant's admitted prior art as modified by Brungart so that an HRTF pair is selected from a plurality of HRTF pairs in order to produce positional errors within an acceptable range (column 5, line 32-33).

11. **Claim 71** is rejected under 35 U.S.C. 103(a) as being unpatentable over the applicant's admitted prior art in view of Brungart (*Auditory Localization in the Near-Field*) in further view of Begault (3D Sound For Virtual Reality and Multimedia) in further view of Begault (U.S. Patent 5,173,944).

Regarding claims **71**, the applicant's admitted prior art as modified by Brungart fails to disclose but Begault teaches of wherein applying a gain factor occurs before the

spectral shaping of the left and right (Figure 2). The applicant's admitted prior art as modified by Brungart discloses that each channel implicitly will have a different gain (See above apropos rejection of claim 54). It would have been obvious to modify the applicant's admitted prior art as modified by Brungart to apply a different gain before the spectral shaping occurs in order to increase the value of the signal (column 4, line 47).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Devona E. Faulk whose telephone number is 571-272-7515. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DEF

HUYEN LE
PRIMARY EXAMINER